

been computationally simulated; for comparison, the performances of linear and nonlinear coherent DTTLs have also been computationally simulated. The results of these simulations show that, among other things, the expected mean-square timing errors of coherent

and noncoherent DTTLs are relatively insensitive to window width. The results also show that at high signal-to-noise ratios (SNRs), the performances of the noncoherent DTTLs approach those of their coherent counterparts at, while at low SNRs, the noncoherent DTTLs

incur penalties of the order of 1.5 to 2 dB.

*This work was done by Marvin Simon and Andre Tkachenko of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact [iaoffice@jpl.nasa.gov](mailto:iaoffice@jpl.nasa.gov). NPO-42540*

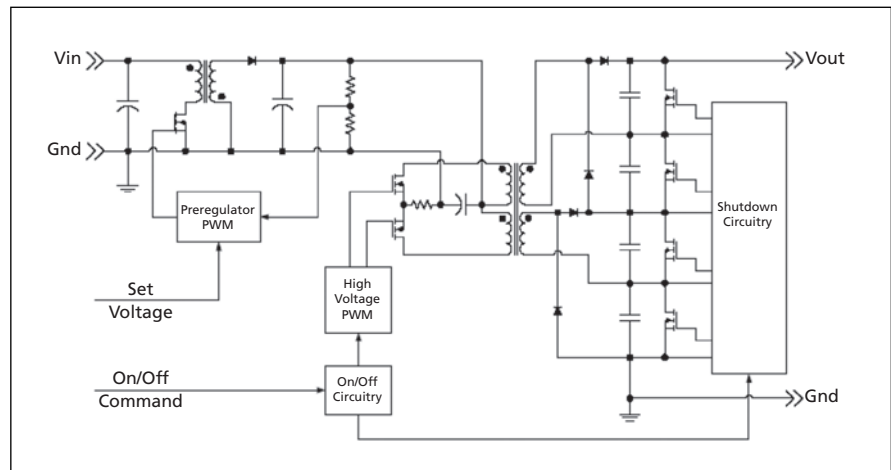
## High-Voltage Power Supply With Fast Rise and Fall Times

**Output is electronically programmable and electronically switchable.**

*Marshall Space Flight Center, Alabama*

A special-purpose high-voltage power supply can be electronically switched on and off with fast rise and fall times, respectively. The output potential is programmable from 20 to 1,250 V. An output current of 50  $\mu$ A can be sustained at 1,250 V. The power supply was designed specifically for electronically shuttering a microchannel plate in an x-ray detector that must operate with exposure times as short as 1 ms. The basic design of the power supply is also adaptable to other applications in which there are requirements for rapid slewing of high voltages.

The power-supply circuitry (see figure) includes a preregulator, which is used to program the output at 1/30 of the desired output potential. After the desired voltage has been set, the outputs of a pulse width modulator (PWM) are enabled and used to amplify the preregulator output potential by 30. The amplification is achieved by use of two voltage doublers with a transformer that has two primary and two secondary windings. A resistor is used to limit the current by controlling the drive voltage of two field-effect transistors (FETs) during turn-on of the PWM. A pulse transformer is



This Power-Supply Circuit features a rise time of 80  $\mu$ s and a fall time of 60  $\mu$ s.

used to turn on four FETs to short-circuit four output capacitors when the outputs of the PWM have been disabled. The most notable aspects of the performance of the power supply are a rise time of only 80  $\mu$ s and a fall time of only 60  $\mu$ s at a load current of 50  $\mu$ A or less. Another notable aspect is that the application of a 0-to-5-V square wave to a shutdown pin of the PWM

causes the production of a 0-to-1,250-V square wave at the output terminals.

*This work was done by Douglas B. Bear-den, Richard M. Acker, and Robert E. Kapustka of Marshall Space Flight Center. For further information, contact Sammy Nabors, MSFC Commercialization Assistance Lead, at [sammy.a.nabors@nasa.gov](mailto:sammy.a.nabors@nasa.gov). Refer to MFS-31912-1.*

## Waveguide Calibrator for Multi-Element Probe Calibration

**Acoustic waveguide technology produces the same acoustic field at each of the sensing elements.**

*Stennis Space Center, Mississippi*

A calibrator, referred to as the "spider" design, can be used to calibrate probes incorporating multiple acoustic sensing elements. The application is an acoustic energy density probe, although the calibrator can be used for other types of acoustic probes. The calibrator relies on the use of acoustic waveguide technology to produce the same acoustic field at each of the sensing elements. As a result, the sensing elements

can be separated from each other, but still calibrated through use of the acoustic waveguides.

Standard calibration techniques involve placement of an individual microphone into a small cavity with a known, uniform pressure to perform the calibration. If a cavity is manufactured with sufficient size to insert the energy density probe, it has been found that a uniform pressure field can only be created at very

low frequencies, due to the size of the probe. The size of the energy density probe prevents one from having the same pressure at each microphone in a cavity, due to the wave effects.

The "spider" design probe is effective in calibrating multiple microphones separated from each other. The spider design ensures that the same wave effects exist for each microphone, each with an individual sound path. The cali-